4.14 NOISE AND VIBRATION

This section describes existing sources and levels of noise in the proposed Project area, and addresses public comments regarding Project contributions to noise and impacts on people in locations such as nursing homes, hospitals, churches, and schools. Potential increases in ambient sound levels due to the Project are identified throughout its lifespan, and mitigation measures are proposed. Issues raised during the public scoping and comment periods on the October 2004 Draft Environmental Impact Statement/Environmental Impact Report (EIS/EIR) included establishment of baseline noise levels, significance criteria, groundborne noise and vibration, the effectiveness of mitigation measures, applicable regulatory standards, and clarification of units used to measure noise.

This section specifically addresses the effects of noise and vibration generated by the Project on people, especially on "sensitive receptors"—individuals or land uses for whom noise and vibration impacts would be particularly disruptive or stressful. Offshore, this would include recreational boaters or fishers in small craft or sailing vessels. Onshore, land uses associated with sensitive receptors would include schools, libraries, hospitals, nursing care facilities, churches, parks, and residential facilities including hotels, motels, typical residential homes, mobile homes, and manufactured housing. The effects of noise on marine biota are addressed in Section 4.7, "Biological Resources – Marine."

4.14.1 Environmental Setting

Noise

The ambient sound level of a region is defined by the total noise generated, from both natural and artificial sources. The magnitude and frequency of environmental noise may vary considerably because of changing weather conditions and the effects of seasonal vegetative cover. Sound characteristics include amplitude (a measure of the strength of the sound wave), the sound wave frequency, and duration. Because the human ear can detect a wide range of sound pressures, sound pressure is converted to sound pressure level, which is measured in units called decibels (dB). The decibel is a logarithmic unit that accounts for large differences in sound wave amplitude or magnitude (the size of the wave), and is a relative measure of the sound pressure with respect to a standardized reference quantity.

Human response to noise depends on the magnitude and the sound frequency distribution. The human ear is more susceptible to higher frequency than lower frequency sounds, so a sound scale that is weighted to account for the response of the human ear is typically used to estimate sound effects on people. This is known as the A-weighted scale, which assigns a weighting of 0 to sounds with a frequency below 10 cycles per second, and a maximum weighting for sounds with a frequency of 2,000 to 5,000 cycles per second. Because the scale is logarithmic, a relative increase of 10 dB on the A-weighted scale (dBA) represents a sound pressure that is 10 times higher. The threshold of human hearing is approximately 10 dBA. However, humans do not

perceive a 10-dBA increase as 10 times louder. Instead, they perceive it as twice as loud. The following is typical of human response to relative changes in noise level:

- A 3-dBA change is the threshold of change detectable by the human ear;
- A 5-dBA change is readily noticeable; and
- A 10-dBA increase is perceived as a doubling and a 10-dBA decrease is perceived as a halving of noise level.

Two measurements that relate the time-varying quality of environmental noise to its known effect on people are the day-night sound level (L_{dn}) and the equivalent sound level ($Leq_{(h)}$). The L_{dn} is the average A-weighted sound level during a 24-hour period ($Leq_{(24)}$) with 10 dBA added to nighttime sound levels from 10 p.m. to 7 a.m., to account for people's greater sensitivity to sound during that period. The L_{dn} was endorsed by the U.S. Environmental Protection Agency (USEPA) and is mandated by the U.S. Department of Housing and Urban Development, the Federal Aviation Administration, and the Department of Defense for land use assessments.

The Leq is the equivalent, steady state sound level that would contain the same acoustical energy as the time-varying level during the same interval. The sound energy from the fluctuating sound pressure levels is averaged over time to create a single number to describe the mean energy, or intensity, level. High noise levels during a monitoring period have a greater effect on the Leq than low noise levels. The duration of the measurement would be shown as $Leq_{(h)}$, e.g., a 24-hour measurement would be shown as $Leq_{(24)}$. The Leq has an advantage over other descriptors because Leq values from various noise sources can be added and subtracted to determine cumulative noise levels. The L_{90} is defined as the level of noise exceeded 90 percent of the time and is often used to characterize background or ambient noise. All noise levels in this section are given as Leqs. Table 4.14-1 lists typical noise levels found in a community.

Table 4.14-1 Typical Noise Levels

Noise Source	Noise Level
Bedroom at night	30 dBA
Quiet suburban nighttime	40 dBA
Indoor noise level determined not to cause annoyance or limit activity ($Leq_{(24)}$)[a]	45 dBA
Outdoor noise level determined not to cause annoyance or limit activity ($Leq_{(24)}$)[a]	55 dBA
Vacuum cleaner at 10 feet (3 meters [m])	70 dBA
Diesel truck at 50 feet (15 m) during the daytime	90 dBA
Loud rock band or jet flyover at 1,000 feet (305 m)	110 dBA

Note:
[a]USEPA 1974.

Vibration

The Federal Transit Administration (FTA) has adopted standards for ground-borne noise and vibration. Those standards were developed for evaluation of noise and vibration impacts from construction and operation of transportation corridor projects in developed urban areas.

Vibration levels are expressed for one typical event, such as a train passby, and are not averaged over a specified period of time as is often done in a noise analysis. Vibration impacts are more limited in range than noise impacts, so vibration impacts are assessed on buildings that are a relatively short distance from the source of the vibration, rather than on larger areas characterized by a particular type of land use. Velocity is described in common units of measurement:

- **Root mean square (RMS) velocity** is used to describe vibration that is felt as motion. The RMS velocity level is a measure of the energy contained in the vibration and is directly related to human perceptibility and to sound radiation by building components. RMS velocity is normally measured in inches per second. For a typical event, levels are expressed in terms of the maximum RMS vibration velocity level dB re 10^{-6} in/sec.
- **Velocity in decibels (VdB)** relative to one micro-inch per second is comparable to dBA for noise but is used to characterize vibration. The following are VdB threshold levels:
  - 65 VdB – Approximate threshold of perception for many humans.
  - 75 VdB – Approximate dividing line between barely perceptible and distinctly perceptible. Many people find transit vibration at this level unacceptable.
  - 85 VdB – Vibration acceptable only if there are an infrequent number of events per day.

  In addition to the human impact, the FTA has adopted generally accepted criteria for avoidance of construction-related damage in its guidance manual:
  - 0.20 inches per second (approximately 100 VdB) for fragile buildings.
  - 0.12 inches per second (approximately 95 VdB) for extremely fragile buildings.

4.14.1.1 Offshore

The existing sound levels at the proposed offshore location of the floating storage and regasification unit (FSRU)—12.01 nautical miles (NM) (13.83 miles or 22.25 kilometers [km] offshore—vary depending on weather conditions and ship traffic. However, the final EIS for the nearby Point Mugu Sea Range characterized the area's average baseline noise levels at 50 to 55 dBA (U.S. Navy Naval Air Warfare Center Weapons Division [NAWCWD] 2002). As discussed in Section 4.3, "Marine Traffic," more than 10,000 commercial vessels transit the area annually. Fishing and recreational vessels also use the area.

4.14.1.2 Shoreline

The pipeline shore crossing would occur under the beach adjacent to the existing Reliant Energy Ormond Beach Generating Station. The drilling activities would occur on the property of the generating station. The ambient acoustic environment in the vicinity of the shore crossing is variable, according to weather conditions and the sea state, with sound levels ranging from 45 to 55 dBA (Entrix 2004a). The ambient noise environment of the proposed shore crossing is dominated by noise from the ocean and wind, with intermittent contributions from birds. However, the generating station also is contributing additional noise in the area.

4.14.1.3 Center Road Pipeline

The proposed pipeline alignment would cross through industrial and rural agricultural areas. The existing noise levels within these areas are attributable to a number of sources, including motor vehicles, industrial and commercial operations, air traffic from local airports, railroad transportation, and agricultural operations. Sound levels for industrial areas generally range from 60 to 70 dBA, and sound levels in agricultural areas and background levels are typically 40 to 50 dBA; however, typical tractors and similar mechanical equipment can produce noise levels from 75 to 85 dBA at 50 feet (15.2 m). Establishment of actual noise baseline levels at this time would not necessarily be representative of the baseline levels at the time of construction. This analysis presumes that existing noise levels are in compliance with city and county noise ordinances.

4.14.1.4 Line 225 Pipeline Loop

The land uses and typical noise levels associated with land uses along this pipeline route include industrial (60 to 70 dBA), commercial (55 to 65 dBA), parks (50 to 60 dBA), and suburban residential areas (50 to 60 dBA during the day, and 40 to 50 dBA at night). Establishment of actual noise baseline levels at this time would not necessarily be representative of the baseline levels at the time of construction. This analysis presumes that existing noise levels are in compliance with city and county noise ordinances.

4.14.2 Regulatory Setting

The major Federal, State, and local laws, regulations, and ordinances governing noise in the Project areas are listed in Table 4.14-2.

Table 4.14-2 Major Laws, Regulatory Requirements, and Plans for Noise

Law/Regulation/Plan/ Agency	Key Elements and Thresholds; Applicable Permits
Noise	
Federal	
Federal Noise Control Act of 1972 (40 Code of Federal Regulations [CFR] 204) - *USEPA*	• Regulates noise emissions from operation of all construction equipment and facilities; establishes noise emission standards for construction equipment and other categories of equipment; and provides standards for the testing, inspection, and monitoring of such equipment. Gives states and municipalities primary responsibility for noise control.
USEPA – Levels of Environmental Noise - *USEPA*	• In 1974, USEPA published Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety. This document provides information for state and local governments to use in developing their own ambient noise standards. USEPA determined that an L_{dn} of 55 dBA protects the public from indoor and outdoor activity interference.
State	
California Noise Control Act of 1973 (Health and Safety Code, Division 28)	• Declares that excessive noise is a serious hazard to public health and welfare; establishes the Office of Noise Control with responsibility to set standards for noise exposure in cooperation with local governments or the State legislature.
Local	
Ventura County General Plan - *Ventura County Planning Division*	• Establishes noise standards within the County. • Construction Noise Threshold Criteria: The maximum allowable 1-hour average noise levels (Leq) are as follows: 55 dBA (or ambient noise level plus 3 dBA, whichever is greater) from 7 a.m. to 7 p.m. on weekdays and 9 a.m. to 7 p.m. on Saturday, Sundays, and holidays for a construction project lasting more than 8 weeks; 50 dBA (or ambient noise level plus 3 dBA, whichever is greater) from 7 p.m. to 10 p.m., and 45 dBA (or ambient noise level plus 3 dBA, whichever is greater) from 10 p.m. to 7 a.m. on weekdays and 10 p.m. to 9 a.m. Saturdays, Sundays, and holidays. These levels are measured at the nearest noise receptor area or 10 feet from the nearest noise sensitive building. • Ventura County Ordinance 4124, Loud or Raucous Nighttime Noise in Residential Zones prohibits loud or raucous noise which is audible to the human ear during the hours of 9 p.m. to 7 a.m. at a distance of 50 feet from the property line of the noise source, or 50 feet from any such noise source if the noise source is in public right-of-way.
City of Oxnard, Ordinance No. 2292 - *City of Oxnard*	• Ordinance of the City of Oxnard Concerning the Regulation of Sound, Section 19-60.5, Designated Sound Zones, indicates time and dBA level restrictions in designated sound zones: - 7 a.m. to 10 p.m.: Zone I, Residential – 55 dBA; Zone II, Commercial – 65 dBA; Zone III, Industrial – 70 dBA - 10 p.m. to 7 a.m.: Zone I, Residential – 50 dBA; Zone II, Commercial – 60 dBA; Zone III, Industrial – 70 dBA - The ordinance does not pertain to construction related noise, provided that the activities occur between the hours of 7 a.m. and 6 p.m. on weekdays and Saturday.

Table 4.14-2 Major Laws, Regulatory Requirements, and Plans for Noise

Law/Regulation/Plan/ Agency	Key Elements and Thresholds; Applicable Permits
Santa Clarita Municipal Code, Title 11 *- City of Santa Clarita*	• Chapter 11.44, "Noise Limits," Section 11.44.040, indicates time and dBA level restrictions in designated sound zones: Residential Zone – Day 65 dBA, Night 55 dBA; Commercial and Manufacturing Zone – Day 80 dBA, Night 70 dBA
Vibration	
Transit Noise and Vibration Impact Assessment *U.S. Department of Transportation – Federal Transit Administration*	• Standards for Ground-borne Noise and Vibration • High-Sensitivity Buildings – 65 VdB; Residential – 72 VdB for frequent events, 80 VdB for infrequent events; Institutional Buildings – 75 VdB for frequent events, 83 VdB for infrequent events

4.14.3 Significance Criteria

In general, impacts could be considered significant if the Project would result in any of the following conditions:

- A substantial temporary or periodic increase, greater than 10 dBA, in ambient noise levels in the Project vicinity above levels existing without the Project. A 10 dBA increase is a commonly used threshold to gauge the increase in noise from construction over background because this increase is perceived as twice as loud by most individuals;
- A substantial temporary or periodic increase in ambient vibration levels greater than 75 VdB in the Project vicinity;
- Project construction (temporary) or operation (permanent or periodic) noise levels that exceed the local noise ordinance or any applicable noise or vibration regulations promulgated on the State or Federal level at sensitive locations such as, but not limited to, residences, schools, parks, places of worship, or hospitals; or
- A substantial (3 dBA) permanent increase in ambient noise levels or a permanent increase in ambient vibration levels above 65 VdB. These levels represent increases in noise or vibration that would be noticeable by nearby residents.

4.14.4 Impact Analysis and Mitigation

This section describes noise impacts associated with construction and operation of the proposed Project. Applicant-proposed measures (AMs) and agency-recommended measures (MMs) are defined in Section 4.1.5, "Applicant Measures and Mitigation Measures."

Impact NOI-1: Noise Generated During the Installation of the FSRU and Offshore Pipelines

Noise generated by vessels or equipment during installation of the mooring system, FSRU, and offshore pipelines could result in temporary increases in noise levels in the area, which could impact sensitive noise receptors such as recreational boaters or fishers (Class II).

The FSRU would be fabricated outside of the United States by a commercial shipbuilding facility with experience in the construction of offshore facilities, LNG carriers, and spherical Moss-type LNG containment systems. It would be towed across the Pacific Ocean to the mooring point where it would be installed at its permanent offshore location and tied in to the offshore pipelines. Construction equipment to install and tie in the FSRU to the mooring point would consist of typical offshore vessels, such as construction barges, anchor-handling tug supply vessels, and survey equipment. Additional equipment is described in Section 2.5, "Construction and Installation: FSRU and Vicinity," and Table 2.5-1 in Chapter 2, "Description of the Proposed Action." As shown in this table, the size and horsepower of the equipment varies, ranging from 1,500-hp crew boats that would transport workers to 15,000-hp tug supply vessels that would transport materials and facilitate equipment positioning and pipelaying. Installation of the FSRU and tie-in to the mooring point would be anticipated to require approximately 24 days total, using 12-hour workdays. Installation of the offshore pipelines is anticipated to require approximately 35 days. Similar vessels and equipment would be used for the construction of the offshore pipelines. Dynamically positioned vessels would be used to position the pipes directly onto the seafloor.

Noise generated by construction vessels would add to ambient noise in the vicinity of the Project caused by existing vessel traffic. Project construction noise has been designated a Class II impact because of the potential for the project to increase noise by greater than 10 dBA over ambient background noise levels, but only for a temporary and limited period of time. Additionally, project construction noise would be locally concentrated for brief durations of time as construction activities progress seaward along the route of the pipelines. Therefore, this impact would be a short-term significant impact.

Although no one lives in the area, commercial, fishing, and recreational vessels transit the area regularly. The crews of these vessels could encounter the construction vessels or be passed by a supply vessel and be temporarily impacted by noise from Project-related vessels. Recreational boaters and commercial fishing boats could avoid the project area during construction and thereby limit their exposure to project-related noise; however, should they transit the project area, they would temporarily be exposed to greater noise levels. Boaters in powered-vessels would not be particularly susceptible to additional noise because engine noise from their own vessels would dominate. However, recreational boaters in sailboats or other non-powered vessels could be impacted by the increased noise associated with construction. Because there are so many commercial vessels in the area, most of these boaters would be accustomed to encountering the noise associated with other vessels. Again, given the

transitory nature of construction activities, this would be a significant, but short-term impact.

To minimize noise impacts on non-Project related boaters, the Applicant has incorporated the following measure into the proposed Project:

AM MT-1a. **Safety Vessel Warnings** would apply to this impact (see Section 4.3, "Marine Traffic").

Mitigation Measures for Impact NOI-1: Noise Generated During the Installation of the FSRU and Offshore Pipelines

MM NOI-1a. **Efficient Equipment Usage.** The Applicant shall:

- Operate construction equipment only on an as-needed basis during this period, and to maintain it to the manufacturer's specifications. This will serve to reduce the number of noise producing events.
- Ensure that equipment engine covers are in place and mufflers are in good working condition for the installation of the mooring system, FSRU, and offshore pipeline.
- Require that prospective contractors for the offshore pipeline installation address noise reduction measures in their respective bid proposals, such as (1) the extent to which they will use engines with lower noise ratings, (2) phased construction activities to reduce simultaneous operations of engines, and (3) all other practices they would follow to reduce equipment noise emissions.

MM MT-1c. **Notices to Mariners** would apply to this impact (see Section 4.3, "Marine Traffic").

With the implementation of MM NOI-1a, the operation of equipment on an as-needed basis would result in fewer pieces of equipment operating simultaneously. The operation of less equipment at any given time would reduce the overall noise level. By using equipment engine covers and mufflers in good working condition, a reduction of up to 20 dBA could be achieved for individual pieces of equipment.

In addition, boaters would be notified in advance and warned of construction so that they could avoid transiting near the construction area, which would further reduce potential noise impacts to non-Project-related marine traffic. Implementation of these mitigation measures would reduce this short-term noise impact to below its significance criteria.

Impact NOI-2: Long-Term Noise Generated During FSRU Operations

Recreational boaters and fishers at certain distances from the FSRU could hear noise generated by FSRU operations over the long-term (Class I).

The FSRU would use power-generating equipment, pumps, compressors, and other rotating equipment that create noise. Sound pressure levels at a distance of 3.3 feet (1 m) are listed in Table 4.14-3 for the major noise-producing equipment during operation of the FSRU.

Table 4.14-3 FSRU Equipment Noise during Operation

Equipment	Location	dBA in Air (at 3.3 feet [1 m])
Submerged combustion vaporizer	Fore	118
Booster pump	Fore	94
LP boil-off gas compressor	Fore	90
Main gas generator drivers	Aft	109
Seawater distribution pump	Aft	85
Fire water pumps	Aft	111
Fire water pumps	Fore	111
Ballast water pumps	Aft	87
Air compressors	Aft	110

Source: C.J. Engineering Consultants 2004.

Potential noise impacts on workers during operation of the FSRU that are addressed under Occupational Safety and Health Administration regulations are not discussed in this evaluation because such regulations constitute requirements the Project must meet as a matter of law.

In an acoustic study conducted by the Applicant, models of the hull and deck radiation efficiency and the through-hull acoustic transmission to air were used to provide estimates of the near-field-radiated noise (C.J. Engineering Consultants 2004). These were combined with the radiated noise from the deck-mounted machinery, and then a propagation model was used to provide estimates of the airborne noise at distant locations. Based on this modeling, which appears to be reasonable with respect to source data and methodology, the equivalent airborne radiated noise during operation of the proposed FSRU was predicted to be 73 dBA at a distance of 0.3 mile (0.5 km), 67 dBA at 0.6 miles (1 km) and less than 50 dBA at a distance of 3.1 miles (5 km).

As discussed previously, noise levels are typically 50 to 55 dBA in the vicinity of the proposed FSRU (U.S. Navy NAWCWD 2002). Given this background and the predicted noise from the operation of the FSRU of less than 50 dBA at 3.1 miles (5 km), the operating noise would not normally be distinguishable 3.1 miles (5 km) or more from the unit. However, at a lesser distance from the FSRU, the operating noise may become noticeable and at less than 0.6 mile (1 km) noise level could interfere with normal conversation. Therefore, people on board commercial, fishing, or recreational boats would have noticeable difficulties with normal conversation when they pass at distances

of 0.6 mile (1 km) from the FSRU and verbal communication would be increasingly difficult as vessels approach the edge of the safety zone around the FSRU at 1,640 feet or 0.3 mile radius (500 m or 0.5 km).

Only authorized personnel will be allowed to approach the FSRU within the safety zone, which will prevent boaters from exposure to noise impact in this area and for other safety precautions (see Section 4.2, "Public Safety and Risk Analysis"). However, boaters transiting the Area to Be Avoided (ATBA) potentially would notice the noise levels. Therefore, impacts to these boaters would exceed the significance criteria; however, the impact would be transitory because boaters can leave the area. To warn boaters near the FSRU and in the ATBA, and to thereby reduce potential exposure to significant noise, foghorns would be installed on the FSRU platform to generate warning signals at 146 dBA (100 hertz) at 3.3 feet (1 m) per U.S. Coast Guard regulation 33 CFR 67.10. This signal level is required in order for the foghorn to be audible at 2 miles (3.2 km). In addition, the device must sound a 2-second blast every 20 seconds during low visibility conditions (less than 2 miles [3.2 km] visibility). Visibility along the nearby coastal area off Point Mugu, California is low for an average 6.3 percent of the time. The foghorn noise level as heard onshore would be no greater than 37 dBA under most conditions. This is an almost inaudible level of noise and therefore would not have a significant impact on onshore noise receptors.

Mitigation Measures for Impact NOI-2: Long-Term Noise Generated During FSRU Operations

MM BioMar-5a. Noise Reduction Design. The Applicant shall work with marine architects, acoustic experts and mechanical engineers and the USCG, among others, to design the FSRU and its equipment to reduce, to the maximum extent feasible, the output of cumulative noise from the facility.

Recreational boaters and fishers would be prohibited from the safety zone, but noise impacts during Project operations would occur at levels that exceed the significance criteria outside of the safety zone but within the ATBA. This impact would remain significant and unmitigatable; therefore, it would be a Class I impact, but of short duration and transient in nature because boaters are presumed to be transiting the area.

Impact NOI-3: Temporary Noise Generated by Support Vessels During Offshore Operations

LNG carriers, crew boats and supply vessels, or helicopters could temporarily increase noise levels for sensitive receptors, such as recreational boaters and fishers during operations (Class I).

Vessels associated with offshore operations can be expected to be heard at a noise level of 90 dBA at 50 feet (15.2 m) away. There is potential for non-Project related boaters to come within this range of Project-related vessels, if not closer. As a result, noise from Project-related vessel traffic could adversely impact people on other vessels

at close distances. This has been designated a Class 1 impact because of the potential for an exceedance of 10 dBA over ambient background noise levels. However, recreational boaters and fishers could easily avoid coming into close proximity to crew boats or supply vessels, and all boaters would be transient; therefore, this would be a short-term significant impact.

Helicopters may be used to access the FSRU in emergencies or to transport guests; however, the number of helicopter trips cannot be predicted. Noise levels from passing helicopters would vary among aircraft models and atmospheric conditions. Typically, noise from a passing helicopter ranges from 68 to 78 dBA at approximately 1,300 feet (396 m) and is only detectable for 30 seconds (Santa Barbara County 2002). As noted, however, the Federal Aviation Administration's minimum flight heights would not apply to helicopters. Although helicopter traffic is expected to be limited, there is potential for noise levels to adversely impact receptors when in operation. Similar to noise impacts associated with supply vessels, the duration of noise exposure would be short-term.

The Applicant has incorporated the following measures into the proposed Project:

AM NOI-3a. **Daytime Operations.** The Applicant would operate crew boats, supply vessels, and helicopters during daytime hours, except during emergencies. The operation of these vessels would be less disturbing during daytime hours when there is greater ambient background noise and people are not typically involved in activities that require lower noise levels.

AM AIR-5b. **Reduced Vessel Traffic Between the FSRU and Port Hueneme** would apply to this impact (see Section 4.6, "Air Quality").

Implementation of these Applicant measures would limit the frequency of noise-producing events and would reduce the impacts, but marine traffic transiting near vessels or helicopter traffic associated with the Project would still be subject to a short-term significant impact from the vessel/helicopter noise; therefore, this impact would remain significant and not completely mitigatable. As a result, it is a Class I impact.

Impact NOI-4: Temporary Noise Generated During Construction using Horizontal Directional Boring (HDB), Horizontal Directional Drilling (HDD), or Other Drilling Techniques

HDB at the shore crossing and HDD or other drilling techniques at onshore waterways and intersection crossings could temporarily increase noise levels for sensitive receptors. Noise levels could exceed local noise ordinances or permit conditions (Class I).

HDB operations would generate relatively high noise levels and would occur 24 hours per day for 108 days for construction at the shore crossing (54 days for each HDB). Primary equipment that would be used during HDB operations and corresponding noise emission levels are presented in Table 4.14-4. The proposed shore crossing is located next to the Reliant Energy Ormond Beach Generating Station and would be subject to

the City of Oxnard's sound ordinance for Sound Zone II Residential Property. The City of Oxnard's sound ordinance limits noise levels to 55 dBA during the day or 50 dBA at night for Sound Zone II Residential Property and 70 dBA at anytime for an industrial area.

As shown in Table 4.14-4, the worst-case noise level for the HDB activities is expected to be 102 dBA at 50 feet (15.2 m), which would be on the Reliant Energy Ormond Beach Generating Station property. During the construction period, the anticipated noise level at the closest industrial facility would be approximately 64 dBA, which is below the City of Oxnard's noise ordinance for industrial facilities.

Table 4.14-4 Construction Noise from HDB

Equipment Type	Reference dBA	Number of Devices	Average Load (percent)	Estimated Noise Level, dBA (root-mean squared) (feet/meters)					
				50/ 15.2	100/ 30.5	250/ 76.2	500/ 152	1,000/ 305	2,500/ 762
Horizontal boring rig	100	1	80	99	93	85	79	73	65
Large drilling rig (HDD/HDB)	100	1	80	99	93	85	79	73	65
Mud cleaner generator	72	1	80	71	65	57	51	45	37
Mud pumps	70	2	80	72	66	58	52	46	38
Fluid-handling pumps	70	4	80	75	69	61	55	49	41
Track backhoe	85	1	50	82	76	68	62	56	48
All-terrain forklift	85	1	50	82	76	68	62	56	48
Light towers	72	6	100	80	74	66	60	54	46
Heavy lift crane	85	1	50	82	76	68	62	56	48
18-wheeler truck	85	1	50	82	76	68	62	56	48
Worst-case result				**102**	**96**	**88**	**82**	**76**	**68**

Sources: Entrix 2005b; USEPA 1971; Plog 1988.

Using an aerial photograph, the closest residence is approximately 1.1 miles (1.8 km) from the HDB entry point and would be in Ventura County; therefore, Ventura County noise ordinances would apply. The anticipated noise level at this residence would be 60 dBA, which exceeds the Ventura County noise ordinances for all periods of the day; therefore, the noise generated during the HDB installation would represent a short-term significant impact.

Some of the waterbody crossings would require HDD, slick boring, or case boring (see Section 4.8, "Biological Resources – Terrestrial"). Certain roads intersections also would require HDD or boring. These locations may include crossing of State Route

(SR) 1 (Pacific Coast Highway), the Southern Pacific Railroad, U.S. 101 (Ventura Freeway), SR 118 (Los Angeles Avenue) in Ventura County and SR 126 (San Fernando Road and Magic Mountain Parkway) in Los Angeles County. Depending on the location of the drilling, the effects would vary and although they would be short-term, they could be significant. Therefore, this is Class I impact.

The Applicant has incorporated the following measure into the proposed Project:

AM NOI-4a. Construction Noise Reduction Measures

- **Monitoring.** The work area would be monitored for noise and vibration levels prior to beginning construction work to establish the background and during construction to determine compliance with noise ordinances and vibration criteria.
- **Enclose power unit.** The drilling rig power unit would be enclosed.
- **Noise Barriers.** The drilling rig would be partially enclosed or noise barriers would be placed around it.
- **Enclose mud pumps and engines.** The mud pumps and associated engines would be partially or totally enclosed.
- **Enclose generator sets.** Generator sets would be totally enclosed or acoustically packaged generator sets would be used.
- **Partially enclose mud mixing.** Mud mixing and cleaning equipment would be partially enclosed or noise barriers would be placed around this equipment.
- **Provide engine compartment treatments.** Engine compartment treatments would be provided for mobile cranes and boom trucks.
- **Modify backup alarms.** Backup alarms on mobile equipment would be modified.
- **Orient loading bins.** Loading bins would be oriented to minimize noise impacts on adjacent areas.
- **Restrict use of mobile equipment.** Use of mobile equipment would be restricted during nighttime hours.
- **Enclose light set engines.** Engines for the light sets would be totally enclosed.
- **Temporary hay bales as noise barriers.** Hay bales would be placed on site as a temporary noise barrier.
- **Place silencers on all engines.** Silencers on all engines would be placed on all equipment where possible.

Mitigation Measures for Impact NOI-4: Temporary Noise Generated During HDB, HDD, or Other Drilling Techniques

MM NOI-4b. **Use Noise Blankets.** During Project construction, noise blankets shall be used to fully enclose equipment associated with boring where residences occur within 2,000 feet (610 m) and work occurs after 6 p.m.

MM NOI-4c. **Limit Heavy Equipment Activity near Residences.** Heavy equipment activity adjacent to residences shall be limited to the shortest possible period required to complete pipeline installation.

MM NOI-4d. **Cover the Equipment Engine.** The equipment engine shall be covered and the Applicant shall ensure that mufflers are in good working condition.

MM NOI-4e. **Establish Telephone Hotline.** A phone number shall be established and publicized for members of the public to call should they have a noise complaint. Upon receiving a complaint, noise monitors will measure the levels and ensure that all appropriate noise controls are being implemented.

MM NOI-4f. **Establish Procedures.** The Applicant or its designated representative shall establish procedures to stop or curtail drilling/boring or add additional measures to respond to any noise complaints or exceedances of any ordinances. However, it may not be possible to cease drilling since HDB cannot be stopped once it has begun.

Implementation of the Applicant measures and mitigation measures listed above would reduce the noise levels to the residence in Ventura County from approximately 60 dBA to 40 dBA (see Table 4.14-5); therefore at this location, mitigation would reduce the impact below the significance criteria. However, residents and businesses closer than 0.5 miles (0.8 km) to the HDD areas at stream crossings and street intersections would still be subject to a short-term significant impact from the construction noise that is likely to exceed local noise ordinances. As a result, temporary noise during drilling would remain a Class I impact.

Table 4.14-5 illustrates the reduction in noise levels that can be achieved by employing some of the mitigation measures listed above.

Table 4.14-5 Anticipated Noise Reduction for Mitigation

Equipment Type	Distance 6,000 Feet	Enclose power unit	Rig noise barriers	Enclose pumps and engine	Enclose generator sets	Enclose mud mixing	Engine compartment Treatments	Enclose light tower engines	Hay bale barriers	Engine silencers	Noise blankets	Reduced Sound Level at 6000 Feet
Horizontal Boring Rig	57	8	5						4		15	25
Large Drilling Rig (HDD)	57	8	5						4		15	25
Mud Cleaner Generator	29				8				4			17
Mud Pumps	30			8		8			4			10
Fluid-Handling Pumps	33			8					4			21
Track Backhoe	40						8		4			28
All-Terrain Forklift	40								4			36
Light Towers	38							8	4			26
Heavy Lift Crane	40						8		4			28
18-Wheeler Truck	40								4			36
Worst-Case Result	**60**											**40**

Source: Patty's Industrial Hygiene and Toxicology 1978.
Note: Conservative noise reduction values were used as actual noise reduction is dependent on the frequency spectrum of the sources.

Impact NOI-5: Temporary Vibration Generated During Horizontal Directional Boring (HDB), Horizontal Directional Drilling (HDD), and Pipeline Construction Activities

HDB, HDD, boring, trenching, and other construction activities could temporarily create vibration levels at sensitive receptors (Class I).

The construction equipment proposed for the onshore portion of the pipeline was compared to available construction equipment vibration data. Vibration impact distances applicable to the pipeline construction period were identified. Table 4.14-6 presents estimated project-specific impact distances for FTA vibration-sensitive receptors.

For the Center Road Route and its alternatives, the proposed HDB work area for the shore crossing, and subsequent surface facility location, is within the perimeter of the Reliant Ormond Beach Generating Station. The nearest residence is approximately 6,000 feet (1829 m) away. The Reliant building is approximately 250 feet (76 m) from the HDB location. Based on aerial photograph review, no other potentially vibration-sensitive uses within the Reliant facility are closer than 250 feet (76 m) to the HDB alignment. The analysis above shows that HDB vibration would be reduced to a level below the FTA criteria of 75 VdB for frequent event – institutional buildings, within 130

Table 4.14-6 Potential Vibration Impact Distances (in feet)

Activity	High Sensitivity Receptor	Residential Receptor	Institutional Building
FTA criteria (VdB)	65[a]	72	75
HDD	Approx. 200[a]	130[b]	<130
HDB	<200	120[c]	<120
Trenching, loaded trucks, etc.	<200	120[d]	<120

Sources: USDOT 1995; BHPB.

Notes:
[a]Distance to 65 VdB based on extrapolation of available VdB versus distance data.
[b]HDD VdB based on available tunnel boring machine data.
[c]HDB VdB based on available caisson drill rig data.
[d]Trenching based on available large bulldozer data.

feet (40 m) of the HDB alignment. Extrapolation of the vibration reduction over distance data shows HDB vibration would be reduced to the 65 VdB range (the FTA's approximate threshold of vibration perception) at a distance of about 200 feet (61 m). Even though HDB would be 24-hour operations, the vibration generated by the process would pose no significant impact.

Table 4.17-6 in Section 4.17, "Transportation" identifies locations where HDD or trenching may be conducted which may cause temporary vibration. Along the proposed Center Road pipeline route, there are 9 residential receptors within 120 feet of the potential HDD activity and 15 for the Line 225 Pipeline Loop, which may be subject to vibration impacts.

The construction of the pipeline would cause temporary vibration in the immediate vicinity of the construction sites. On-site construction vibration would occur mainly from heavy-duty construction equipment, e.g., trucks, backhoes, excavators, loaders, cranes, and drill rigs. Noise and vibration from on-site construction activities may be intermittent or continuous with a short duration. Mobile equipment, e.g., backhoes, excavators, loaders, and cranes, may operate near a vibration-sensitive receptor along the pipeline route at various times during the construction period. Pipeline construction activities along the proposed Center Road pipeline route would be conducted within 120 feet of a residential receptor at three locations and for the Line 225 Pipeline Loop at 52 locations.

The following applies here:

AM NOI-4a. Construction Noise Reduction Measures.

Mitigation Measure for Impact NOI-5: Temporary Vibration Generated During HDB, HDD, and Pipeline Construction Activities

MM NOI-5a. Restricted Work Hours. The Application or its designated representative shall ensure that work hours are restricted for

pipeline construction activities, with the exception of HDB, involving motorized equipment from 7 a.m. to 7 p.m. Monday through Saturday.

MM NOI 4c. Limit Heavy Equipment Activity Near Residences.

Restricting construction hours to 7 a.m. to 7 p.m. Monday through Saturday, with the exception of HDB, would reduce the impact of vibration during evening hours and Sundays when most people are engaged in activities that require lower vibration levels. In addition, limiting the activity of heavy equipment would reduce the exposure to vibration for those who might be the most sensitive. Implementation of the above applicant measure and mitigation measures would reduce HDD-generated vibration impacts, but not to a level below the significance criteria. Therefore, this is a Class I impact.

Impact NOI-6: Noise Generated During Construction of the Onshore Pipeline

Site preparation, pipeline installation, and construction of aboveground facilities could temporarily increase noise levels for sensitive receptors, such as schools and residences. Noise levels may exceed county and/or city noise ordinances or permit conditions during the installation of the onshore pipeline and associated structures (Class I).

Construction of the onshore pipelines would cause temporary increases in ambient noise levels in the immediate vicinity of the construction sites. On-site construction noise would occur mainly from heavy-duty construction equipment, e.g., trucks, backhoes, excavators, loaders, cranes, and drill rigs. Typical pipeline construction equipment (both mobile and stationary) and corresponding noise emission levels are presented in Table 4.14-7. As indicated in the table, the worst-case noise level for the construction of the onshore pipeline, excluding HDD, would be 98 dBA at 50 feet (15.2 m). The worst case noise level is derived by assuming that all of the construction equipment listed in Table 4.14-7 is operating simultaneously and combining their sound pressure levels logarithmically. Noise from on-site construction activities that may operate near a noise-sensitive receptor along the pipeline route may be intermittent or continuous, but would be limited to short durations.

Some of the noise levels generated during onshore construction would exceed noise ordinances for the City of Oxnard (see ordinance requirements in discussion of Impact NOI-4) or the City of Santa Clarita. As described above, both of the onshore pipeline routes traverse within 120 feet of numerous residences.

Therefore, construction of the onshore pipelines would generate noise levels that would have significant impacts. Implementation of the mitigation measures discussed below would reduce the noise levels; however, residents and businesses near the construction area would still be subject to short-term significant impacts from the construction noise, and this impact would remain significant after mitigation.

Table 4.14-7 Construction Noise from Typical Pipeline Construction Equipment Activities

Equipment Type	Reference dBA	Number of Devices	Average Load (percent)	Estimated Noise Level, dBA (Root Mean Squared), at the Specified Distance from the Source (feet/meters)					
				50/ 15.2	100/ 30.5	250/ 76.2	500/ 152	1,000/ 305	2,500/ 762
Concrete saw	85	1	50	82	76	68	62	56	48
Trenching machine	85	1	80	84	78	70	64	58	50
Track backhoe	85	1	80	84	78	70	64	58	50
Front loader	85	1	50	82	76	68	62	56	48
Bulldozer	85	1	50	82	76	68	62	56	48
Dragline	85	1	50	82	76	68	62	56	48
Dump truck	91	1	50	88	82	74	68	62	54
Water truck	91	1	50	88	82	74	68	62	54
Utility truck	85	1	50	82	76	68	62	56	48
Heavy fork lift	85	1	50	82	76	68	62	56	48
Lowboy truck	85	4	50	88	82	74	68	62	54
Pipe-stringing truck	85	1	50	82	76	68	62	56	48
Sideboom tractor	85	2	50	85	79	71	65	59	51
Mobile crane	85	1	50	82	76	68	62	56	48
Pipe-bending machine	85	1	50	82	76	68	62	56	48
Welding generator	72	2	50	72	66	58	52	46	38
Utility generator	72	2	50	72	66	58	52	46	38
Air compressor	72	2	50	72	66	58	52	46	38
Dewatering pump	70	2	50	70	64	56	50	44	36
Hydrostatic test pump	70	1	50	67	61	53	47	41	33
Fill dirt screener	72	1	50	69	63	55	49	43	35
Sheepsfoot compactor	85	1	50	82	76	68	62	56	48
Vibratory roller	72	2	50	72	66	58	52	46	38
Hydraulic tamper	72	2	50	72	66	58	52	46	38
Cement truck	91	1	50	88	82	74	68	62	54
Cement pump	70	1	50	67	61	53	47	41	33
Asphalt truck	91	1	50	88	82	74	68	62	54
Asphalt-paving machine	85	1	50	82	76	68	62	56	48
Asphalt roller	85	1	50	82	76	68	62	56	48
Worst-case result[a]				**98**	**92**	**84**	**78**	**72**	**64**

Sources: Entrix 2004b; USEPA 1971; Plog 1988.

Note: [a] The worst case result is derived by adding the noise levels logarithmically using the following formula:

$$Leq_{total} = 10\log\left(10^{\frac{Leq_1}{10}} + 10^{\frac{Leq_2}{10}} + 10^{\frac{Leq_3}{10}} ...etc.\right)$$

The Applicant has incorporated the following into the proposed Project:

AM NOI-4a. Construction Noise Reduction Measures.

Mitigation Measures for Impact NOI-6: Noise Generated During Construction of the Onshore Pipeline

MM NOI-6a. Post Signs. The Applicant or its designated representative shall post signs along the construction right-of-way (ROW) with approximate schedule and contact information.

MM NOI-6b. Equipment Location. The Applicant or its designated representative shall locate stationary equipment, such as compressors and welding machines, away from noise receptors to the extent practicable.

MM NOI 4c. Limit Heavy Equipment Activity Near Residences would apply here.

MM NOI-4d. Cover the Equipment Engine would apply here.

MM NOI-4e. Establish Telephone Hotline would apply here.

MM NOI-4f. Establish Procedures would apply here.

MM NOI-5a. Restricted Work Hours would apply here.

Keeping construction equipment in good repair with engine covers in place and mufflers in good working condition would keep noise levels under control. Restricting construction hours to 7 a.m. to 7 p.m. Monday through Saturday would reduce the impact of noise during early morning and evening hours and Sundays when people are typically engaged in activities that require lower noise levels. With the schedule posted along the ROW, individuals living near the Project area could anticipate higher noise levels and could plan noise-sensitive activities around the construction schedule. Establishing a telephone hotline would provide residents a conduit to contact appropriate Project personnel and make complaints regarding noise issues that could then be addressed by the Project.

Locating stationary equipment such as compressors and welding machines in areas of the construction site away from the residences would allow for greater noise attenuation due to distance and thereby reduce the noise level near residences. In the event that a noise complaint is received from a resident, the noise monitor would evaluate the noise levels and investigate additional mitigation measures that can be employed to reduce the noise level. Although temporary, noise impacts during construction of the onshore pipeline would exceed noise levels specified in local noise ordinances and would therefore exceed their significance criteria.

Impact NOI-7: Noise Generated by Traveling to the Construction Site

Additional vehicular traffic carrying workers, equipment, and materials to the construction sites could temporarily increase noise levels for residences, schools, places of worships, or hospitals (Class III).

This component of construction noise would come mainly from traveling to the staging areas, and from a wide range of truck trips to deliver and recover materials at the work sites along the ROW. The procedures for bringing personnel, materials, and equipment to each work site would vary along the alignment. Truck trips would also be required to deliver heavy construction equipment, pipe, aggregate, asphalt, and other materials.

An estimated 400 to 450 truck roundtrips would be required to deliver equipment and materials to each pipeline segment. The peak noise levels associated with passing trucks (up to 88 dBA at 50 feet [15.2 m]) and commuting worker vehicles would be short-term, but they could be adverse depending on the proximity of sensitive noise receptors to the travel routes and the hours of off-site construction activity. However, since the passing of a vehicle is a short-term event, little noise is added to the hourly Leq (average) for each vehicle. For this reason, the peak Leqs would not exceed the Ventura County 1-hour Leq noise standard. Therefore, the impact would be adverse but not significant and no mitigation measures would be required.

Impact NOI-8: Noise Generated During Onshore Pipeline and Associated Facilities Operations

Repair or maintenance operations of the onshore pipelines and associated aboveground facilities may temporarily exceed county and/or city noise ordinances or permit conditions (Class II).

There are no known noises that would be generated by operation of the metering station or associated valve facilities. However, noise may be generated during repair or maintenance of the pipeline. These noises would be similar to those generated during construction, but would be temporary and of shorter term. To reduce noise levels below the significance criteria, the following mitigation measures would be required.

The Applicant has incorporated the following into the proposed Project:

AM NOI-4a. **Construction Noise Reduction Measures** would apply here.

Mitigation Measures for Impact NOI-8: Noise Generated During Onshore Pipeline and Associated Facilities Operations

MM NOI-4c **Limit Heavy Equipment Near Residences** would apply here.

MM NOI-4d. **Cover the Equipment Engine** would apply here.

MM NOI-5a. **Restricted Work Hours** would apply here.

MM NOI-4f **Establish Procedures** would apply here.

MM NOI-6a. **Post Signs** would apply here.

MM NOI-6b. **Equipment Location** would apply here.

Keeping construction equipment in good repair with engine covers in place and mufflers in good working condition would keep noise levels under control. Restricting construction hours to 7 a.m. to 7 p.m. Monday through Saturday would reduce the impact of noise during early morning and evening hours and Sundays when most people are engaged in activities that require lower noise levels. With the schedule posted along the ROW, individuals living near the Project area could plan noise-sensitive activities around the construction schedule.

Locating stationary equipment such as compressors and welding machines in areas of the construction site away from the residences would allow for more noise attenuation over distance and thereby reduce the noise level at the residences. In the event that a noise complaint is received form a resident, the noise monitor will evaluate the noise levels and investigate additional mitigation measures that can be employed to reduce the noise level. With the implementation of these mitigation measures, noise impacts during operation of the onshore pipeline and associated aboveground facilities would be reduced to below the significance criteria.

Reducing work hours and the use of heavy equipment during construction near residences and providing procedures for receiving and addressing noise related complaints would reduce onshore operational noise impacts to below the significance criteria.

Table 4.14-8 summarizes noise and vibration impacts and mitigation measures.

Table 4.14-8 Summary of Noise Impacts and Mitigation Measures

Impact	Mitigation Measure(s)
Impact NOI-1. Noise generated by vessels or equipment during installation of the mooring system, FSRU, and offshore pipelines could result in temporary increases in noise levels in the area, which could impact sensitive noise receptors such as recreational boaters or fishers (Class II).	**AM MT-1a. Safety Vessel Warnings** (see Section 4.3, "Marine Traffic"). **MM NOI-1a. Efficient Equipment Usage.** The Applicant shall: • Operate construction equipment only on an as-needed basis during this period, and to maintain it to the manufacturer's specifications. This will serve to reduce the number of noise producing events. • Ensure that equipment engine covers are in place and mufflers are in good working condition for the installation of the mooring system, FSRU, and offshore pipeline. • Require that prospective contractors for the offshore pipeline installation address noise reduction measures in their respective bid proposals, such as (1) the extent to which they

Table 4.14-8 Summary of Noise Impacts and Mitigation Measures

Impact	Mitigation Measure(s)
	will use engines with lower noise ratings, (2) phased construction activities to reduce simultaneous operations of engines, and (3) all other practices they would follow to reduce equipment noise emissions. **MM MT-1c. Notices to Mariners** (see Section 4.3, "Marine Traffic").
Impact NOI-2. Recreational boaters and fishers at certain distances from the facility could hear noise generated by FSRU operations over the long-term (Class I).	**MM BioMar-5a. Noise Reduction Design.** The Applicant shall work with marine architects, acoustic experts and mechanical engineers and the USCG, among others, to design the FSRU and its equipment to reduce, to the maximum extent feasible, the output of cumulative noise from the facility.
Impact NOI-3. LNG carriers, crew boats and supply vessels, or helicopters could temporarily increase noise levels for sensitive receptors, such as recreational boaters and fishers (Class I).	**AM NOI-3a. Daytime Operations.** The Applicant would operate crew boats, supply vessels, and helicopters during daytime hours, except during emergencies. The operation of these vessels would be less disturbing to receptors during daytime hours when there is greater ambient background noise and people are not typically involved in activities that require lower noise levels. **AM AIR-5b. Reduced Vessel Traffic Between the FSRU and Port Hueneme** (see Section 4.6, "Air Quality").
Impact NOI-4. HDB at the shore crossing and HDD or other drilling techniques at onshore waterways and intersection crossings could temporarily increase noise levels for sensitive receptors. Noise levels may temporarily exceed local noise ordinances or permit conditions (Class I).	**AM NOI-4a. Construction Noise Reduction Measures. The Applicant shall m**onitor noise levels to comply with applicable regulations, enclose power units, implement noise barriers, enclose mud pumps and engines, enclose generator sets, partially enclose mud mixing, provide engine compartment treatments, modify backup alarms, orient loading bins, restrict use of mobile equipment, enclose light set engines, and place silencers on all engines. **MM NOI-4b. Use Noise Blankets.** During Project construction noise blankets shall be used to fully enclose equipment associated with boring where residences occur within 2,000 feet (610 m) and work occurs after 6 p.m. **MM NOI-4c. Limit Heavy Equipment Activity Near Residences.** Heavy equipment activity adjacent to residences shall be limited to the shortest possible period required to complete pipeline installation. **MM NOI-4d. Cover the Equipment Engine.** The equipment engine shall be covered and the Applicant shall ensure that mufflers are in good working condition. **MM NOI-4e. Establish Telephone Hotline.** A phone number shall be established and publicized

Table 4.14-8 Summary of Noise Impacts and Mitigation Measures

Impact	Mitigation Measure(s)
	for members of the public to call should they have a noise or vibration complaint. Upon receiving a complaint, noise monitors will measure the levels and ensure that all appropriate noise controls are being implemented. **MM NOI-4f. Establish Procedures.** The Applicant or its designated representative shall establish procedures to stop or curtail work or add additional measures to respond to any noise or vibration complaints or exceedances of any ordinances.
Impact NOI-5. HDB, HDD, boring, trenching, and other construction activities could temporarily create vibration levels at sensitive receptors (Class I).	**AM NOI-4a. Construction Noise Reduction Measures.** **MM NOI-5a. Restricted Work Hours.** The Application or its designated representative shall ensure that work hours are restricted for pipeline construction activities, with the exception of HDB, involving motorized equipment from 7 a.m. to 7 p.m. Monday through Saturday. **MM NOI 4c. Limit Heavy Equipment Activity Near Residences.**
Impact NOI-6. Site preparation, pipeline installation, and construction of aboveground facilities could temporarily increase noise levels for sensitive receptors, such as schools and residences. Noise levels may exceed county and/or city noise ordinances or permit conditions during the installation of the onshore pipeline and associated structures (Class I).	**AM NOI-4a. Construction Noise Reduction Measures** **MM NOI-6a. Post Signs.** The Applicant or its designated representative shall post signs along the construction right-of-way with approximate schedule and contact information. **MM NOI-6b. Equipment Location.** The Applicant or its designated representative shall locate stationary equipment, such as compressors and welding machines, away from the noise receptors to the extent practicable. **MM NOI-4c. Limit Heavy Equipment Activity Near Residences.** **MM NOI-4d. Cover the Equipment Engine.** **MM NOI-4e. Establish Telephone Hotline.** **MM NOI-4f. Establish Procedures.** **MM NOI-5a. Restricted Work Hours.**
Impact NOI-7. Additional vehicular traffic carrying workers, equipment, and materials to the construction sites could temporarily increase noise levels for residences, schools, places of worships, or hospitals (Class III).	None.
Impact NOI-8. Repair or maintenance operations of the aboveground facilities may temporarily exceed county and/or city noise ordinances or permit conditions (Class II).	**AM NOI-4a. Construction Noise Reduction Measures.** **MM NOI-4c. Limit Heavy Equipment Near Residences** **MM NOI-4d. Cover the Equipment Engine** would

Table 4.14-8 Summary of Noise Impacts and Mitigation Measures

Impact	Mitigation Measure(s)
	apply here. **MM NOI-5a. Restricted Work Hours** would apply here. **MM NOI-4f. Establish Procedures** would apply here. **MM NOI-6a. Post Signs** would apply here. **MM NOI-6b. Equipment Location** would apply here.

4.14.5 Alternatives

4.14.5.1 No Action Alternative

As explained in greater detail in Section 3.4.1, “No Action Alternative,” under the No Action Alternative, MARAD would deny the license for the Cabrillo Port Project and/or the CSLC would deny the application for the proposed lease of State tide and submerged lands for a pipeline ROW. The No Action Alternative means that the Project would not go forward and the FSRU, associated subsea pipelines, and onshore pipelines and related facilities would not be installed. Accordingly, none of the potential environmental impacts identified for the construction and operation of the proposed Project would occur.

Since the proposed Project is privately funded, it is unknown whether the Applicant would fund another energy project in California; however, should the No Action Alternative be selected, the energy needs identified in Section 1.2, "Project Purpose, Need and Objectives," would likely be addressed through other means, such as through other LNG or natural gas-related pipeline projects. Such proposed projects may result in potential environmental impacts of the nature and magnitude of the proposed Project as well as impacts particular to their respective configurations and operations; however, such impacts cannot be predicted with any certainty at this time.

4.14.5.2 Alternative DWP Location – Santa Barbara Channel/Mandalay Shore Crossing/Gonzales Road Pipeline

Siting of the Project in the Santa Barbara Channel would result in offshore noise impacts similar to those discussed for the Project for both construction and operations. However, given that there is greater vessel traffic in this area, more people may hear noise generated during Project construction and operation. This also implies that there would be additional vessel traffic noise, so ambient noise levels would include vessel traffic. Like the proposed Project, construction noise would be temporary and recreational boaters could avoid the construction zone. All mitigation measures applicable to offshore operations (MM NOI-1a, MM BioMar-5a, AM MT-1a, MM MT-1c, and AM NOI-3a) would be applicable to offshore construction and operations of this alternative. However, like the proposed Project, noise generated on the FSRU during operations would have a significant impact to recreational boaters within 0.6 mile (1

km), since it could interfere with normal conversation, affecting boaters transiting through the ATBA. This impact could not be mitigated; therefore, it would represent a Class I impact.

The shore crossing for this alternative would be at the Reliant Energy Mandalay Generating Station, as opposed to the Reliant Energy Ormond Beach Generating Station. Because the Reliant Energy Mandalay Generating Station is near McGrath State Beach and McGrath Lake, there may be people at these recreational areas who would sensitive to noise generated by the HDB. However, ambient noise in this area would include existing noise generated by the generating station and vehicle traffic on Harbor Boulevard. The location would be in a non-residential area in Ventura County; therefore, Ventura County noise would ordinances apply. The noise impact at this location would represent a substantial temporary increase above ambient noise levels. Compared to the proposed shore crossing, the noise impacts would be similar, however without the potential impact to residences. AM NOI-4a, MM NOI-4b, MM NOI -4d, MM NOI -4e, and MM NOI–4f would apply during construction, maintenance, and operations to reduce the level of impacts to below significance criteria.

The onshore pipeline route for this alternative would cross through many residential neighborhoods, business districts, and agricultural areas. It would pass by six schools and St. John's Regional Medical Center. The construction of the pipeline would cause temporary increases in the ambient sound environment at more sensitive noise receptors (residences and schools) in the immediate vicinity of the construction sites. On-site construction noise would occur mainly from heavy-duty construction equipment, e.g., trucks, backhoes, excavators, loaders, cranes, and drill rigs. Implementation of AM NOI-4a and MM NOI-4b through MM NOI-4f, MM NOI-5a, MM NOI-6a, and MM NOI-6b would help to reduce the construction noise and vibration; however, a Class I impact would occur if drilling/boring or trenching occurs within 1,000 feet of a residence. More, residential noise receptors (approximately 143) would be affected by vibration impacts due to construction of this route. Therefore, despite the implementation of the vibration mitigation measures (AM NOI-4a, MM NOI-4c, and MM NOI-5a), the vibration generated would represent a Class I impact.

4.14.5.3 Alternative Onshore Pipeline Routes

Center Road Pipeline Alternative 1

This alternative would use the same shore crossing as the proposed route and would follow existing rights-of-way, public roads, and/or newly acquired easements. This alternative also would avoid all areas of dense residential housing. The land uses along the pipeline route include industrial and rural agricultural areas. Elementary and high schools, Oxnard College, Peppermint Junction, and St. John's Regional Medical Center would be located within 300 feet (91.4 m) of the pipeline construction activities and are considered noise receptors. The construction of the pipeline would cause temporary increases in the ambient sound environment in the immediate vicinity of the construction sites. On-site construction noise would occur mainly from heavy-duty construction equipment, e.g., trucks, backhoes, excavators, loaders, cranes, and drill rigs.

Implementation of AM NOI-4a and MM NOI-4b through MM NOI-4f, MM NOI-5a, MM NOI-6a, and MM NOI-6b would reduce noise to a level below its significance criteria. This alternative would have a greater number of significant noise impacts than the proposed Center Road Pipeline route since the route would be located closer to more residential areas. A Class I impact would occur if drilling/boring or trenching occurs within 1,000 feet of a residence.

The construction of the pipeline would cause temporary vibration in the immediate vicinity of the construction sites. Mobile equipment, e.g., backhoes, excavators, loaders, and cranes, may operate near a residential receptor along the pipeline route at various times during the construction period. Pipeline construction activities along Center Road Pipeline Alternative 1 would be conducted within 120 feet of a residential receptor at 232 locations; therefore, this would be a temporary Class I impact despite the implementation of the vibration mitigation measures (AM NOI-4a and MM NOI-4c and MM NOI-5a).

Center Road Pipeline Alternative 2

This alternative pipeline alignment would follow existing ROWs and/or public roads. The land uses along the pipeline route include industrial, commercial, rural agricultural and suburban residential areas. The main existing source of noise in the Project area is vehicle traffic on local roads. Noise-sensitive land uses in the general vicinity of the Project's impact area include residences. Noise levels in suburban areas typically range from 50 to 60 dBA during the daytime. In typical urban areas, the noise levels range from 60 to 70 dBA. During worst-case pipeline construction activity, residences would experience temporary increases in noise over the ambient sound environment in the immediate vicinity of the construction sites. On-site construction noise would occur mainly from heavy-duty construction equipment, e.g., trucks, backhoes, excavators, loaders, cranes, and drill rigs. This noise level could be mitigated to a level that is below the significance criteria through implementation of AM NOI-4a and MM NOI-4c, MM NOI-4e, MM NOI-4f, MM NOI-6a, MM NOI-6b, and MM NOI-6c. Because this alternative would traverse through more rural areas that the proposed Center Road Pipeline route, the overall noise impacts would be less significant than those of the proposed route.

The construction of the pipeline would cause temporary vibration in the immediate vicinity of the construction sites. Mobile equipment, e.g., backhoes, excavators, loaders, and cranes, may operate near a vibration-sensitive receptor along the pipeline route at various times during the construction period. Pipeline construction activities along Center Road Pipeline Alternative 2 would be conducted within 120 feet of a residential receptor at 16 locations. HDD activity would also cause temporary vibration in the immediate vicinity. In addition to the shore crossing, there are locations along Center Road Pipeline Alternative 2 where HDD or trenching would be required. There would be 13 residential receptors within 120 feet of the HDD or trenching activity that may be subject to temporary vibration. This vibration level could be reduced through implementation of AM NOI-4a and MM NOI-4c and MM NOI-5a. This impact would

remain significant but temporary and not completely mitigatable; as a result, it is a Class I impact.

Center Road Pipeline Alternative 3

This alternative pipeline alignment would follow the same route as the proposed route and therefore would have the same noise impacts, with the exception of the northern end of the pipeline route for this alternative, which would pass by the Mesa Union School and could create a noise impact at the school. Pipeline construction activities along Center Road Pipeline Alternative 3 would be conducted within 120 feet of residences and would have the potential to cause temporary vibrations at three residences. In addition to the shore crossing, there are locations along Center Road Pipeline Alternative 3 where HDD or trenching would be required. There would be eight receptors within 120 feet of the HDD or trenching activity that may be subject to temporary vibration. This vibration level could be reduced through implementation of AM NOI-4a and MM NOI-4c, and MM NOI-5a. This impact would remain significant but temporary and not completely mitigatable and, as a result, it would be a Class I impact.

Line 225 Pipeline Loop Alternative 1 Route

For the comparable portion of this route, the impacts for the alternatives would be identical to those for the proposed route. Impacts for the part of the alternative route that differs from the proposed route would be very similar to those for the proposed route except that the Line 225 Pipeline Loop Alternative would use HDD to cross the Santa Clara River or be installed under the existing bridge. There would be no receptors within 120 feet of the HDD river crossing for this alternative. There would be 87 residences within 120 feet of the HDD or trenching activity that may be subject to temporary vibration due to pipeline construction. This vibration level could be reduced through implementation of AM NOI-4a and MM NOI-4c, and MM NOI-5a. This impact would remain significant but temporary and not completely mitigatable and, as a result, it is a Class I impact.

4.14.5.4 Alternative Shore Crossing/Pipeline

Arnold Road Shore Crossing/Arnold Road Pipeline

Although the duration of HDB-related noise would be longer with this alternative, trenching activity would be diminished. The location would be in a non-residential area in Ventura County. The noise impact at this location would be a substantial temporary increase in ambient noise levels in the Project vicinity above levels existing without the Project. Noise receptors would include beachgoers at Ormond Beach and people stationed at the Naval Base Ventura County. The noise impacts for this alternative would be similar to the proposed shore crossing route, and the same Applicant measures and mitigation measures (AM NOI-4a and MM NOI-4b through MM NOI-4f, MM NOI-5a, MM NOI-6a, and MM NOI-6b) would be used during construction and maintenance operations. However, the closest residence would be approximately 4,000 feet from the HDB entry point. Noise levels at this residence during the HDB installation

with the implementation of mitigation measures would likely exceed 55 dBA before mitigation, but could be mitigated to less than 45 dBA through the use of AM NOI-4a and MM NOI-4b through MM NOI-4f. Therefore, this would be a Class II impact.

Point Mugu Shore Crossing/Casper Road Pipeline

HDB would take place on Federal land on the Naval Base Ventura County. The impacts for this alternative shore crossing would be the same as those for the Arnold Road Shore Crossing/Arnold Road Pipeline Alternative. Compared to the proposed shore crossing, the noise impacts for this alternative would be fewer because the shore crossing would be in a remote area of the naval facility. The same Applicant measures and mitigation measures (AM NOI-4a and MM NOI-4b through MM NOI-4f, MM NOI-5a, MM NOI-6a, and MM NOI-6b) would be used during construction and maintenance operations. However, the closest residence would be approximately 4,400 feet from the HDB entry point. Noise levels at this residence during the HDB installation with the implementation of mitigation measures would likely exceed 55 dBA before mitigation, but could be mitigated to less than 45 dBA through the use of AM NOI-4a and MM NOI-4b through MM NOI-4f. Therefore, this would be a Class II impact.

4.14.6 References

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